

# Meteorological Overview of TRACE-P

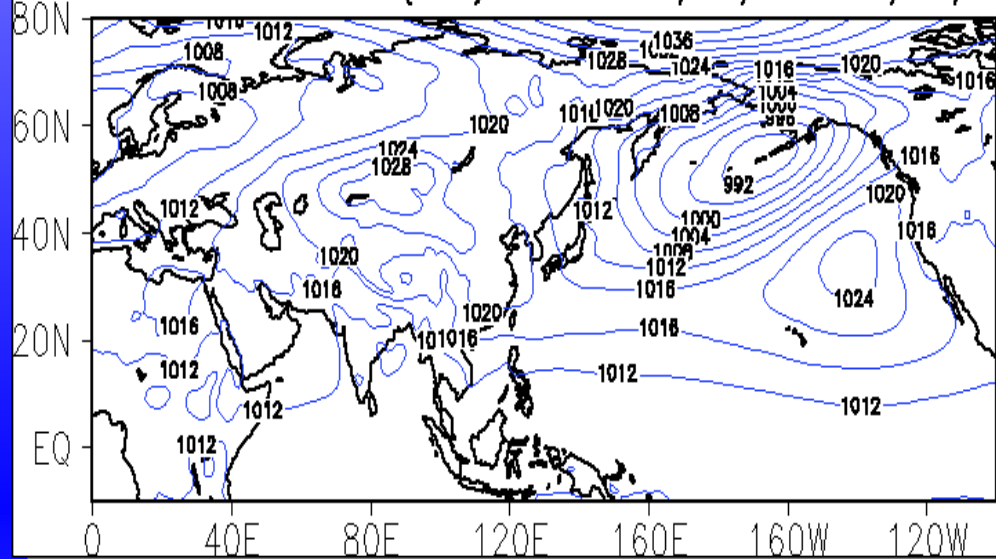
Henry Fuelberg  
Chris Kiley  
John Hannan

Florida State University



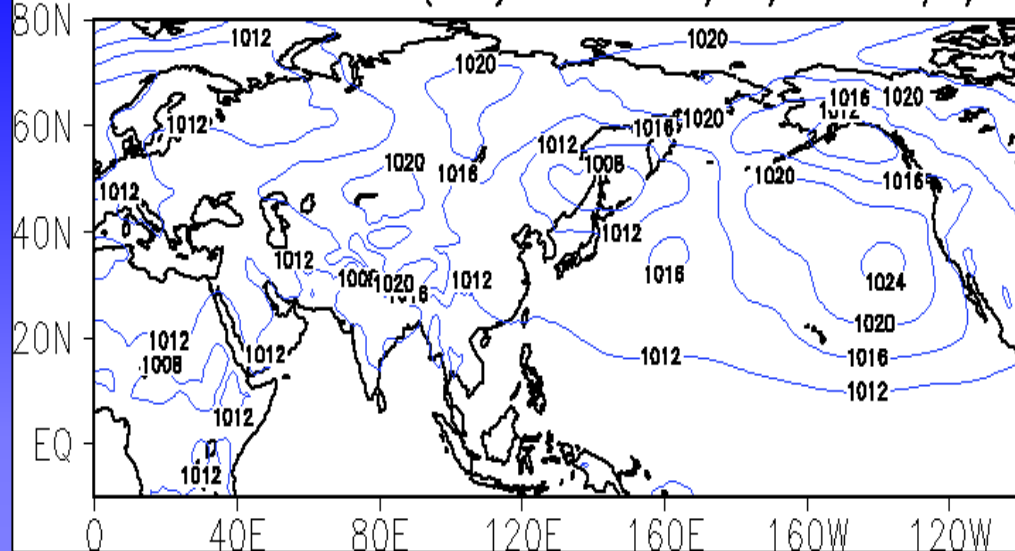
# Sea Level Pressure

Sea Level Pressure (hPa) Mean 2/23/01 to 3/17/01



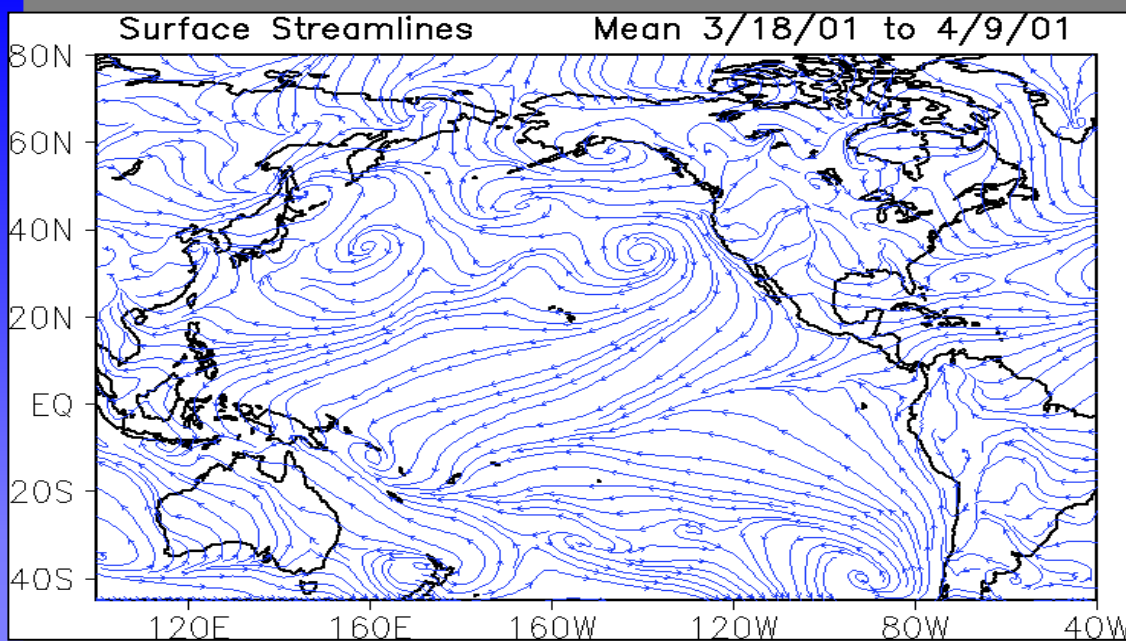
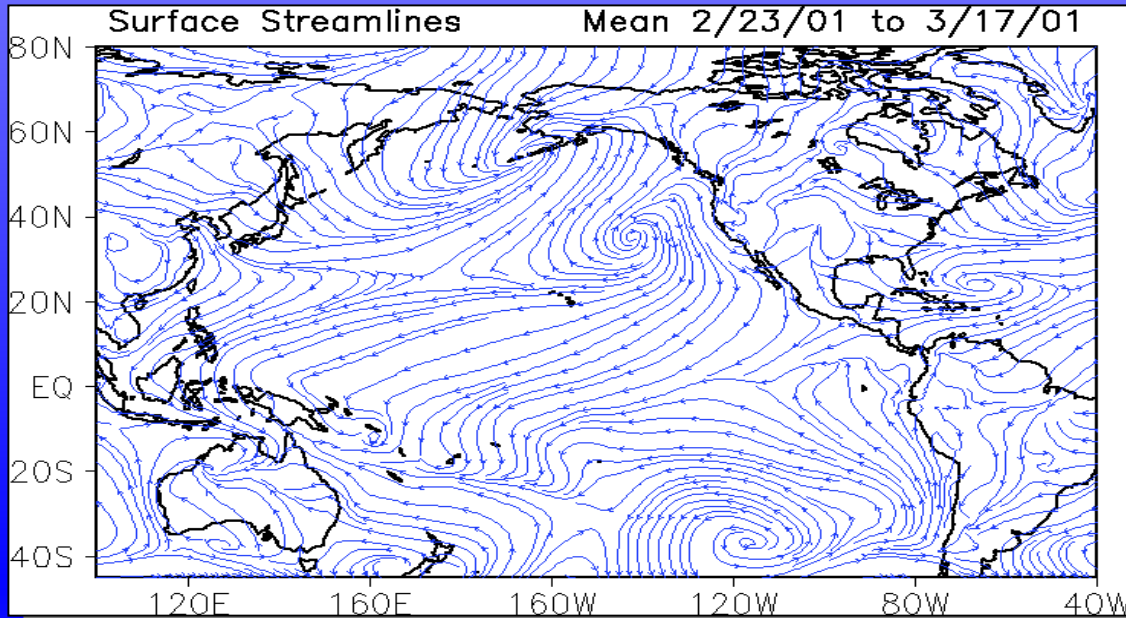
- Three week averages--transient systems out
- 1st Half:
- Strong Aleutian Low
- Strong Siberian High
- Weak Subtropical High

Sea Level Pressure (hPa) Mean 3/18/01 to 4/9/01



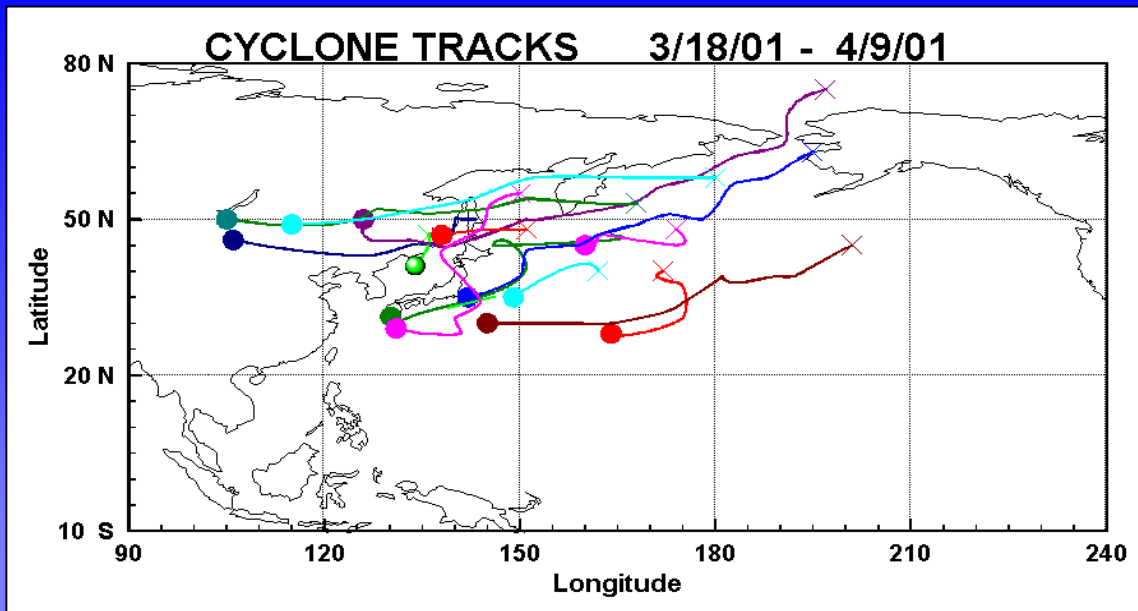
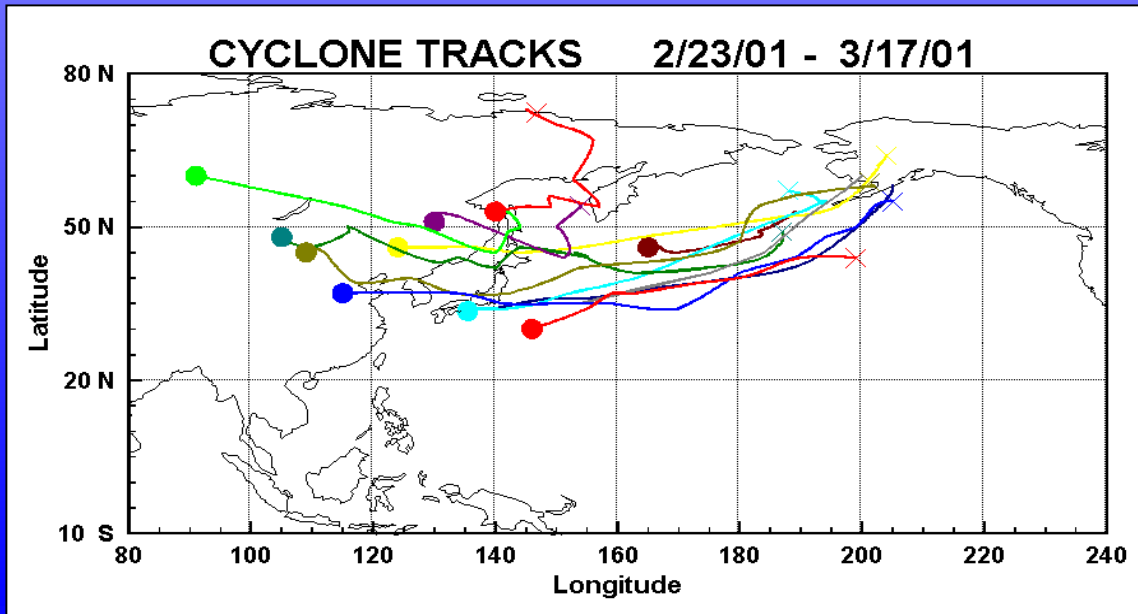
- 2nd Half--into Spring:
- Split Low Pressure
- Weaker Siberian High
- Larger Subtropical High

# Surface Streamlines



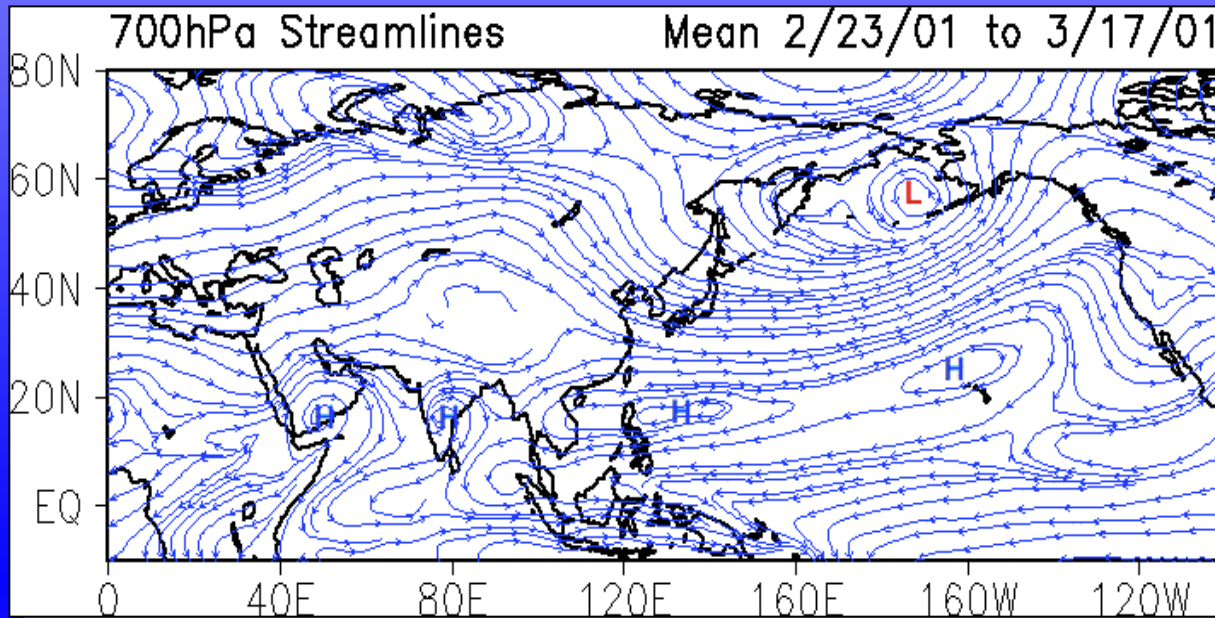
- Circulation centers
- Strong Asian Outflow, north of 35°
- Recirculation into SE Asia
- Weak ITCZ
- Transport to S. Hem.
- Strong SPCZ

# Middle Latitude Cyclones

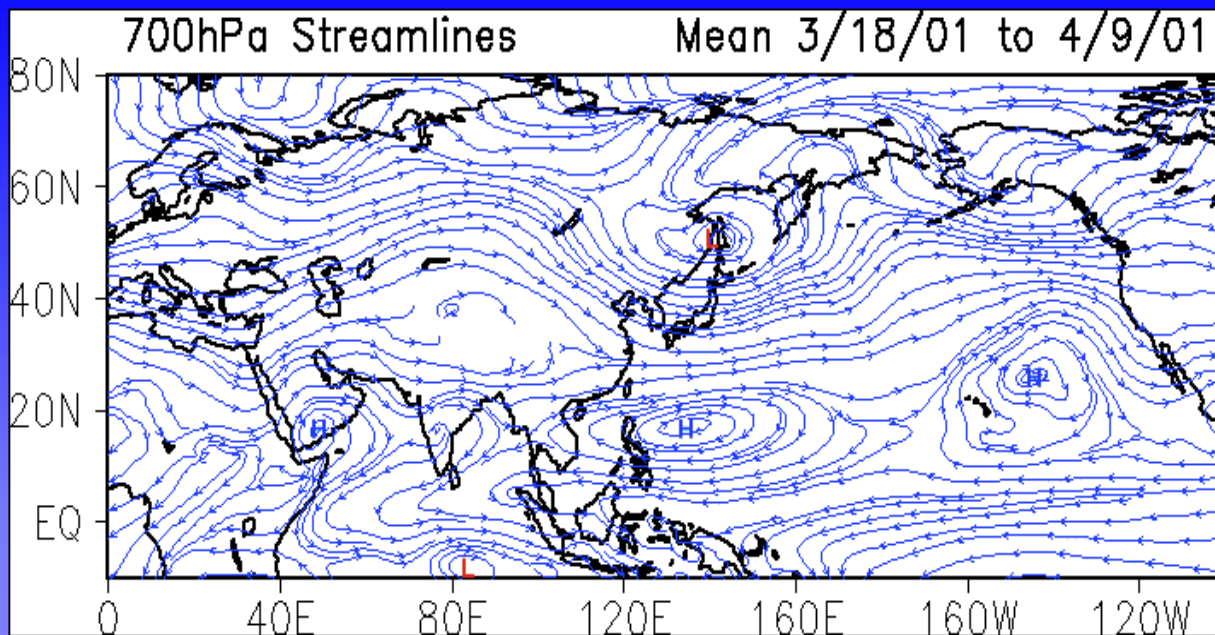


- Systems  $< 1016$  mb
- 1st half:
  - 12 storms
  - Coherent tracks
  - $p_{avg} = 988$  mb
  - Avg. life = 5 days
- 2nd half:
  - 14 storms
  - Less coherent tracks
  - $p_{avg} = 996$  mb
  - Avg. life = 4 days

# 700 mb Flow (~10,000 ft)

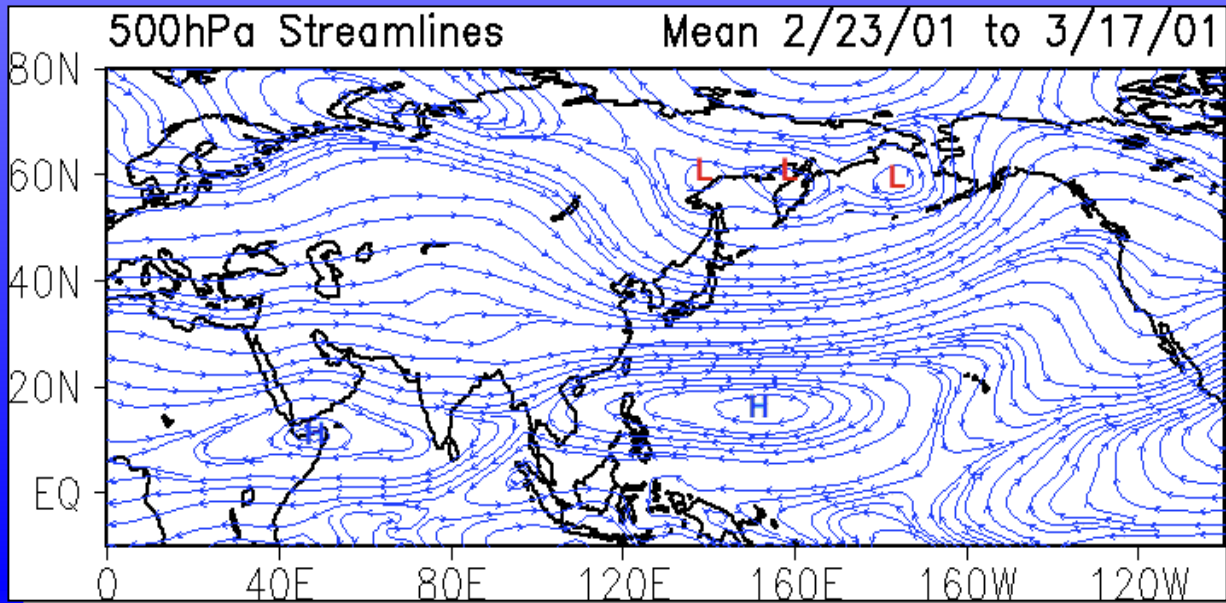


- 1st Half:
  - Aleutian Low
  - Subtropical High
  - Mostly flow from west
- 2nd Half:
  - Low over N. Japan
  - Stronger Subtrop. highs
  - Mostly flow from west

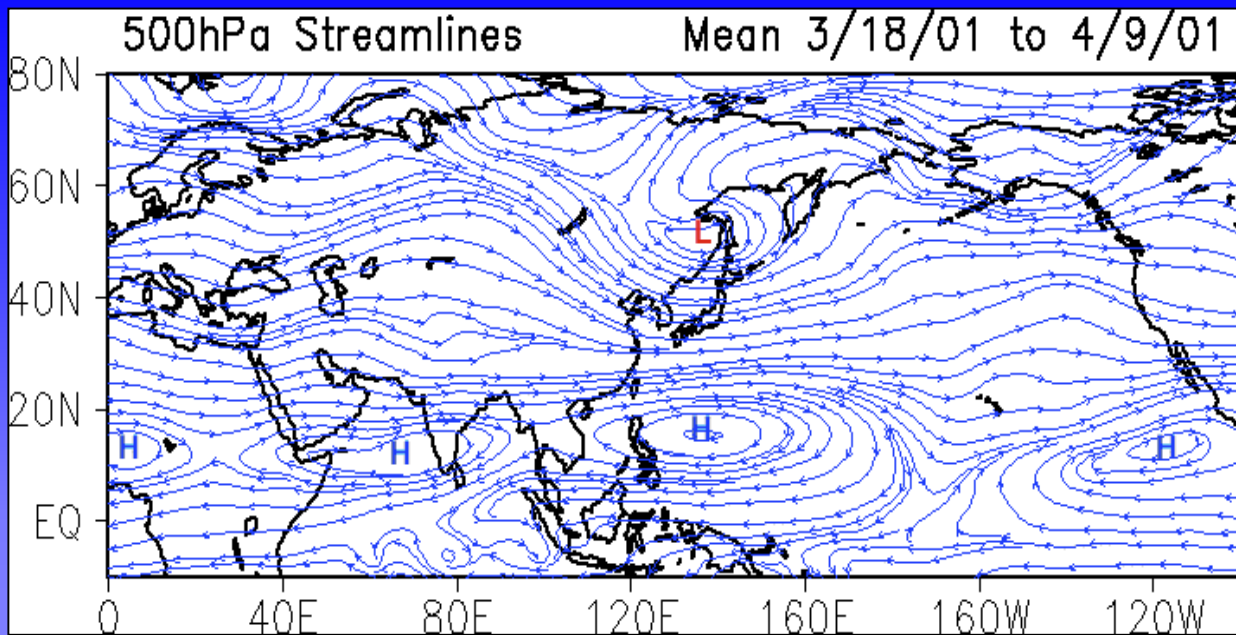




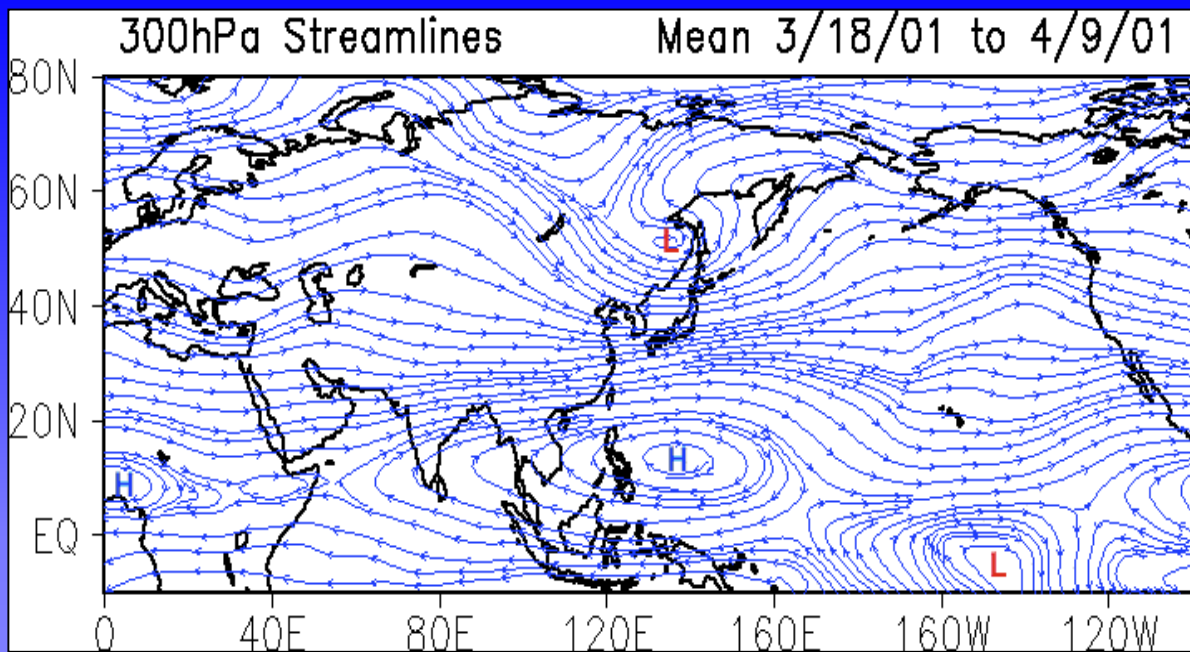
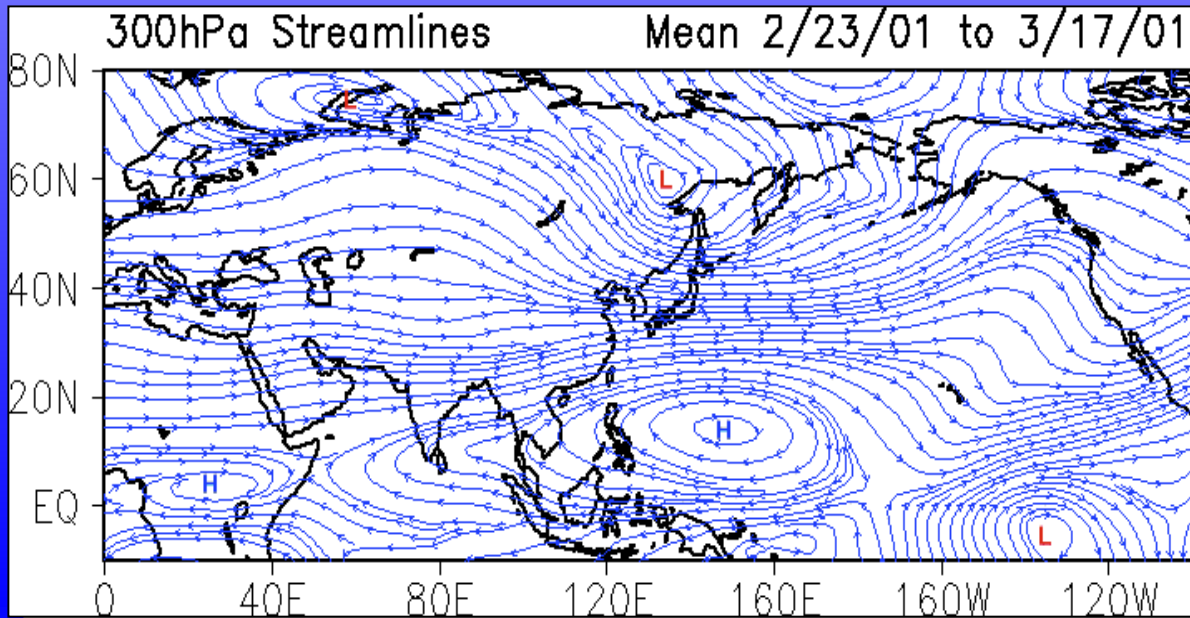
# 500 mb Flow (~18,000 ft)



- Lows near 60° weaken during 2nd half
- Subtropical highs strengthen
- Mostly westerly flow

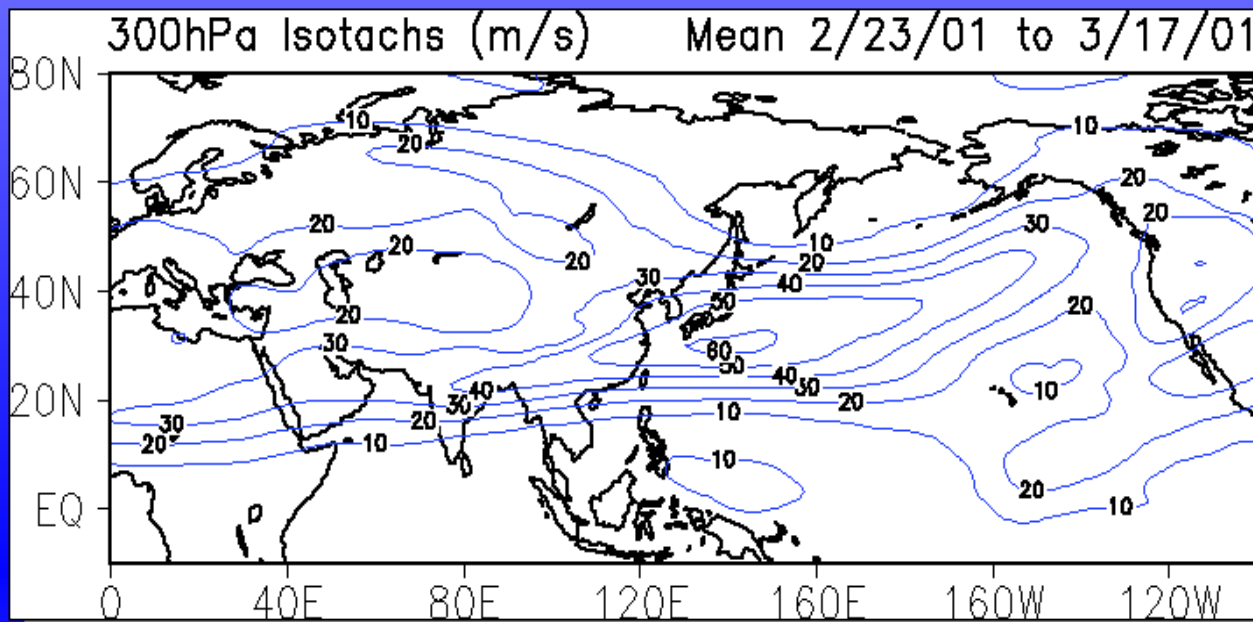


# 300 mb Flow (~30,000 ft)

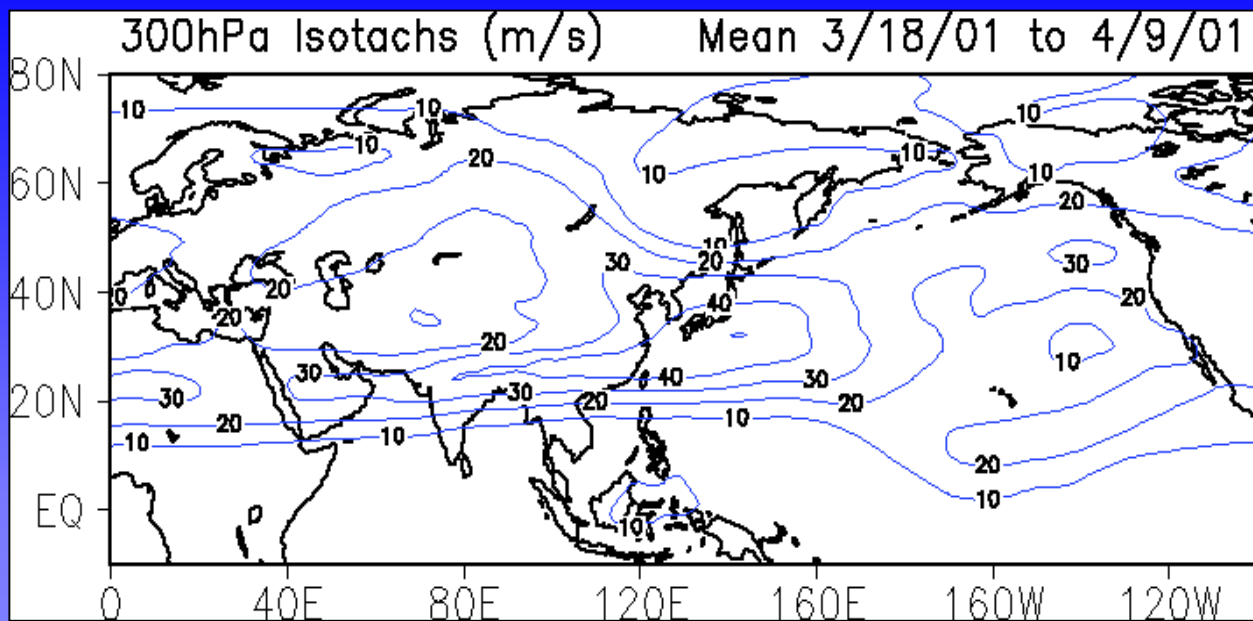


- Few changes over period
- Low NW of Japan
- Subtropical highs
- Mostly westerly flow

# 300 mb Isotachs ( $\text{m s}^{-1}$ )



- Strongest jet near Japan--60  $\text{m s}^{-1}$  average
- Extends from central Africa to Canada



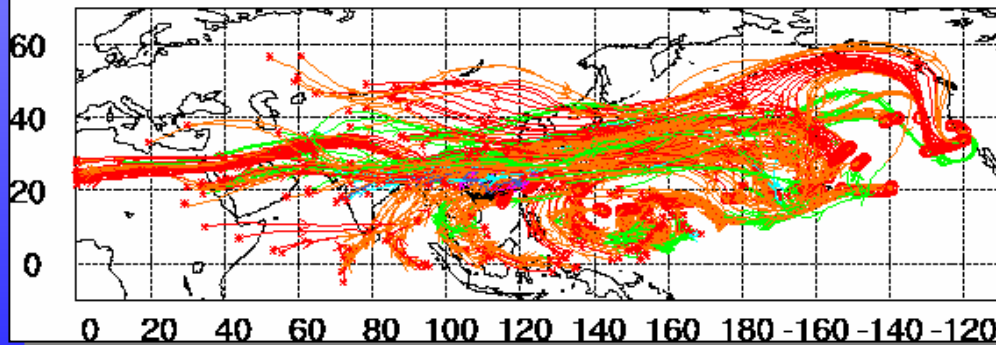
- Secondary jet over Asia
- Weaker winds during 2nd half



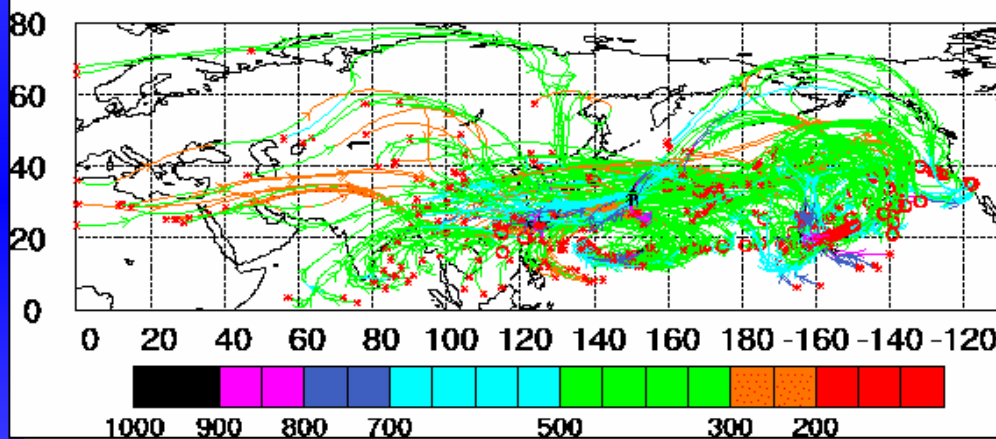
# Transit Flight Trajectory Composites

- Five-days back
- Color-coded heights
- Low Level:
  - River of pollution
  - Specific day's events
- Middle Level:
  - Nebulous, but
  - Oceanic or central/southern Asia
- High Level:
  - From the west
  - From the southwest
  - S. Hemispheric
  - Few from Europe

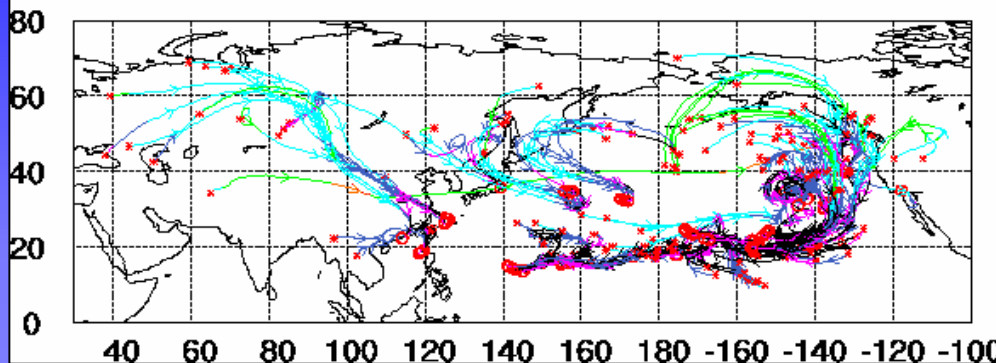
Arrival: 300hPa and Above



Arrival: 550hPa to 450hPa

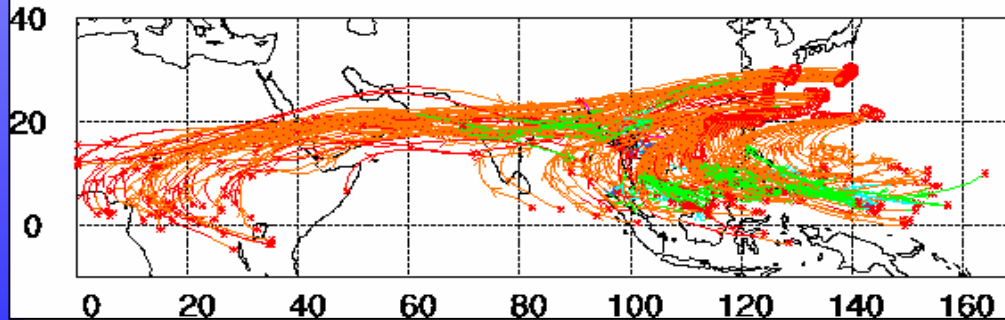


Arrival: 850hPa and Below

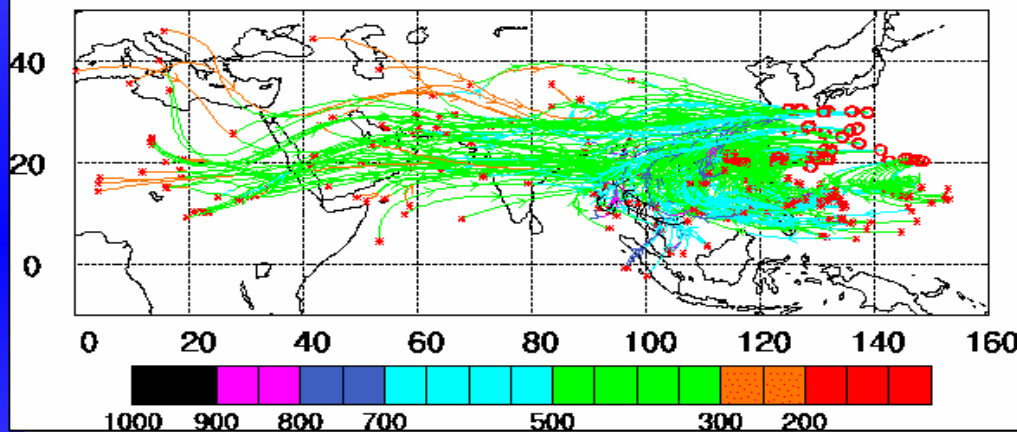


# Hong Kong Area Trajectory Composites

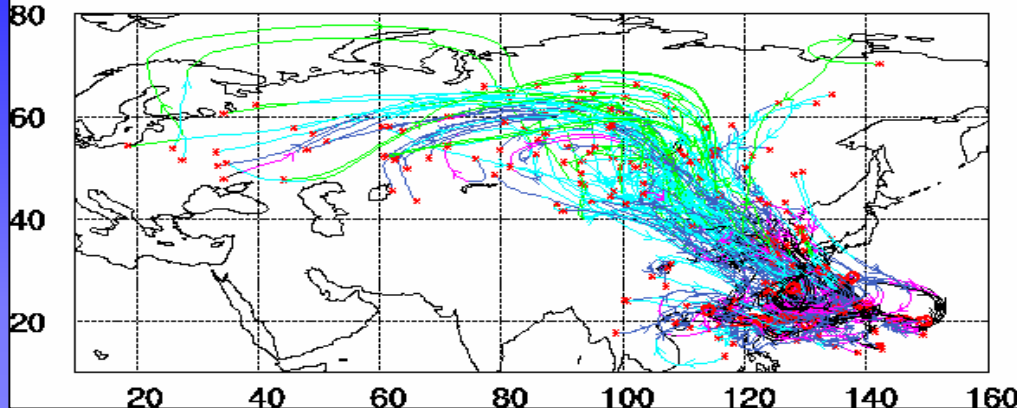
Arrival: 300hPa and Above



Arrival: 550hPa to 450hPa

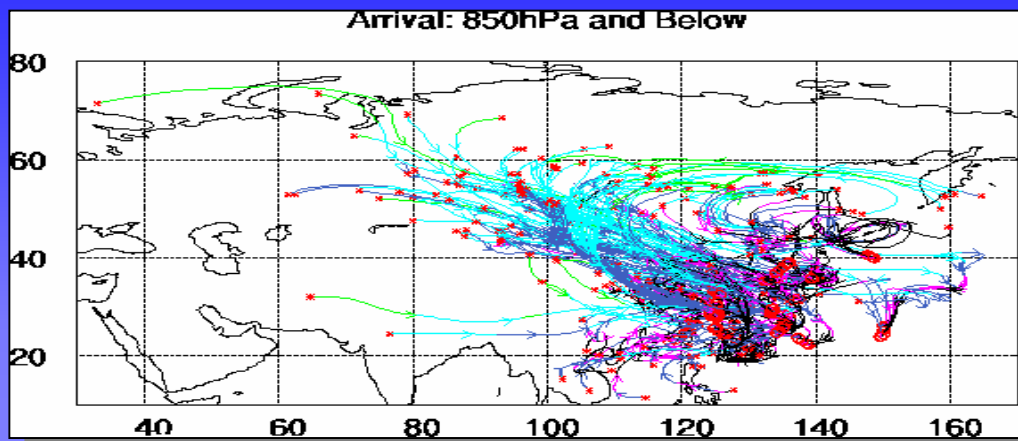
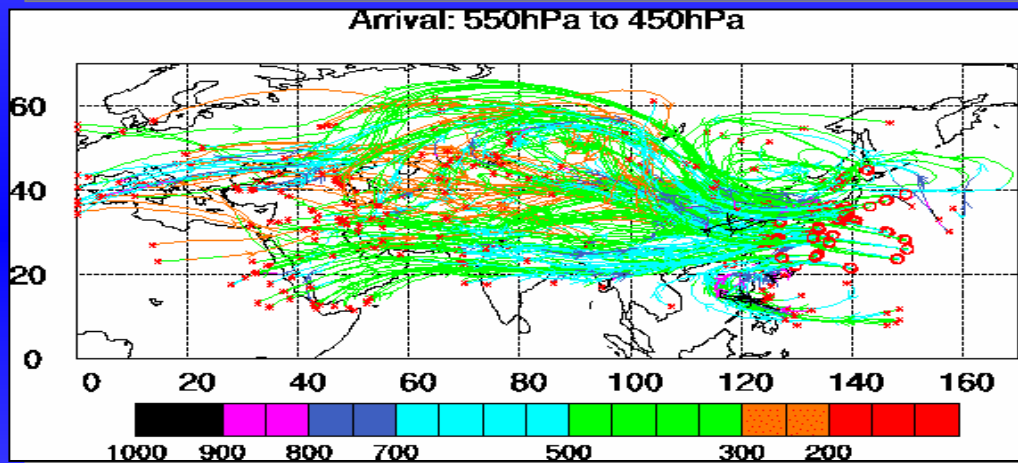
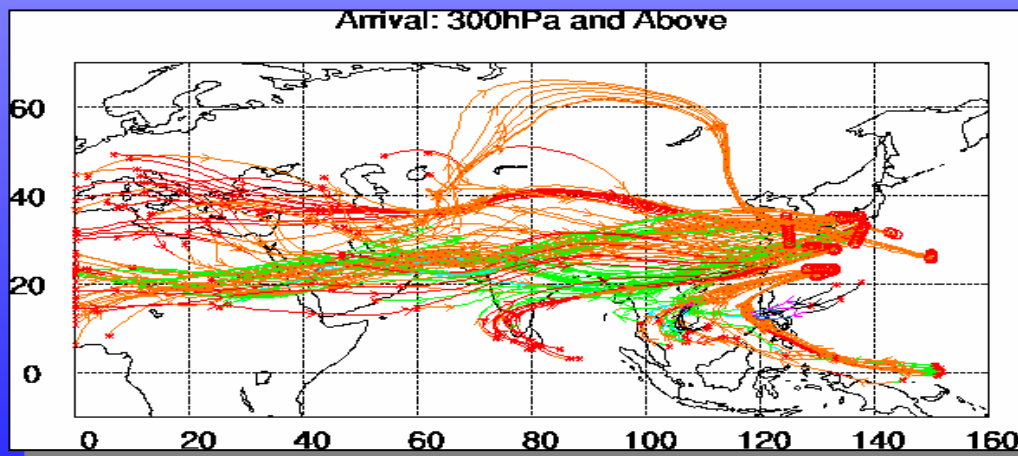


Arrival: 850hPa and Below



- Low levels:
  - Maritime origin
  - Northwestern flow from Asia
  - Europe ~5 days, but few
- Middle - Upper Levels
  - Southeast Asia
  - Tropical Pacific & S. Hem
  - Transit from Africa
  - Few from Europe

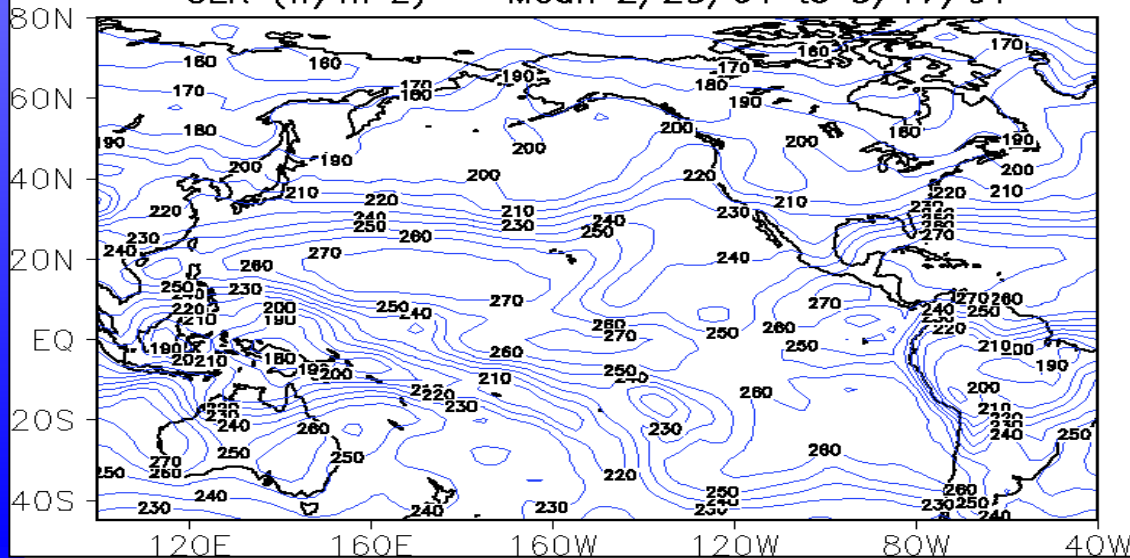
# Yokota Area Trajectory Composites



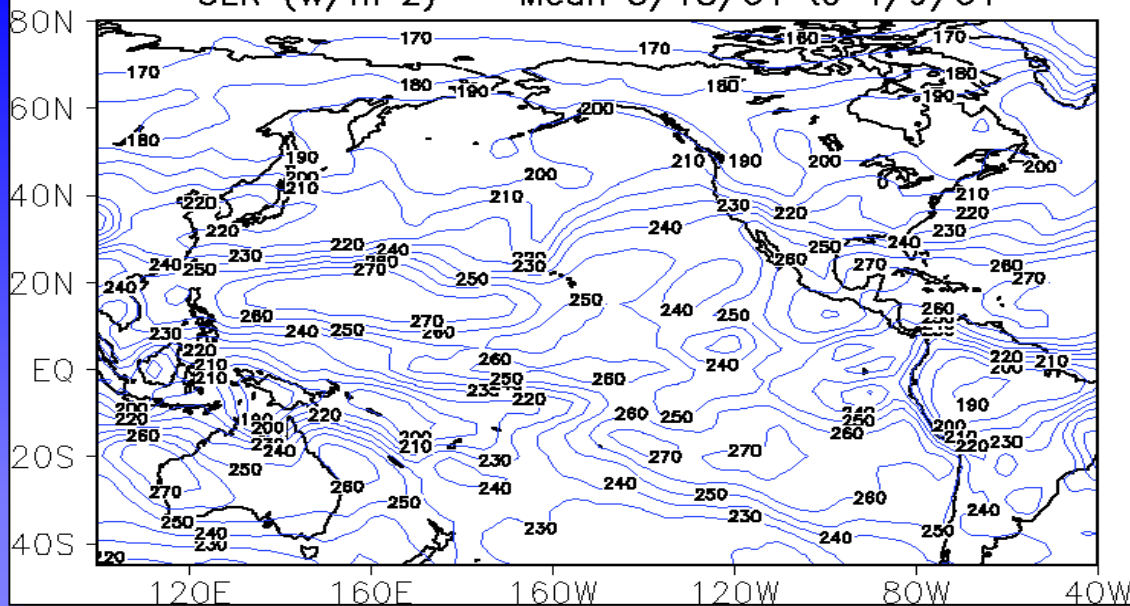
- Low Levels:
  - North Pacific--low area
  - Central Asia
- Middle - Upper Levels
  - Still flow from southeast and So. Hemisphere
  - Central/southern Asia
  - Africa
  - Few from Mediterranean

# Outgoing Longwave Radiation

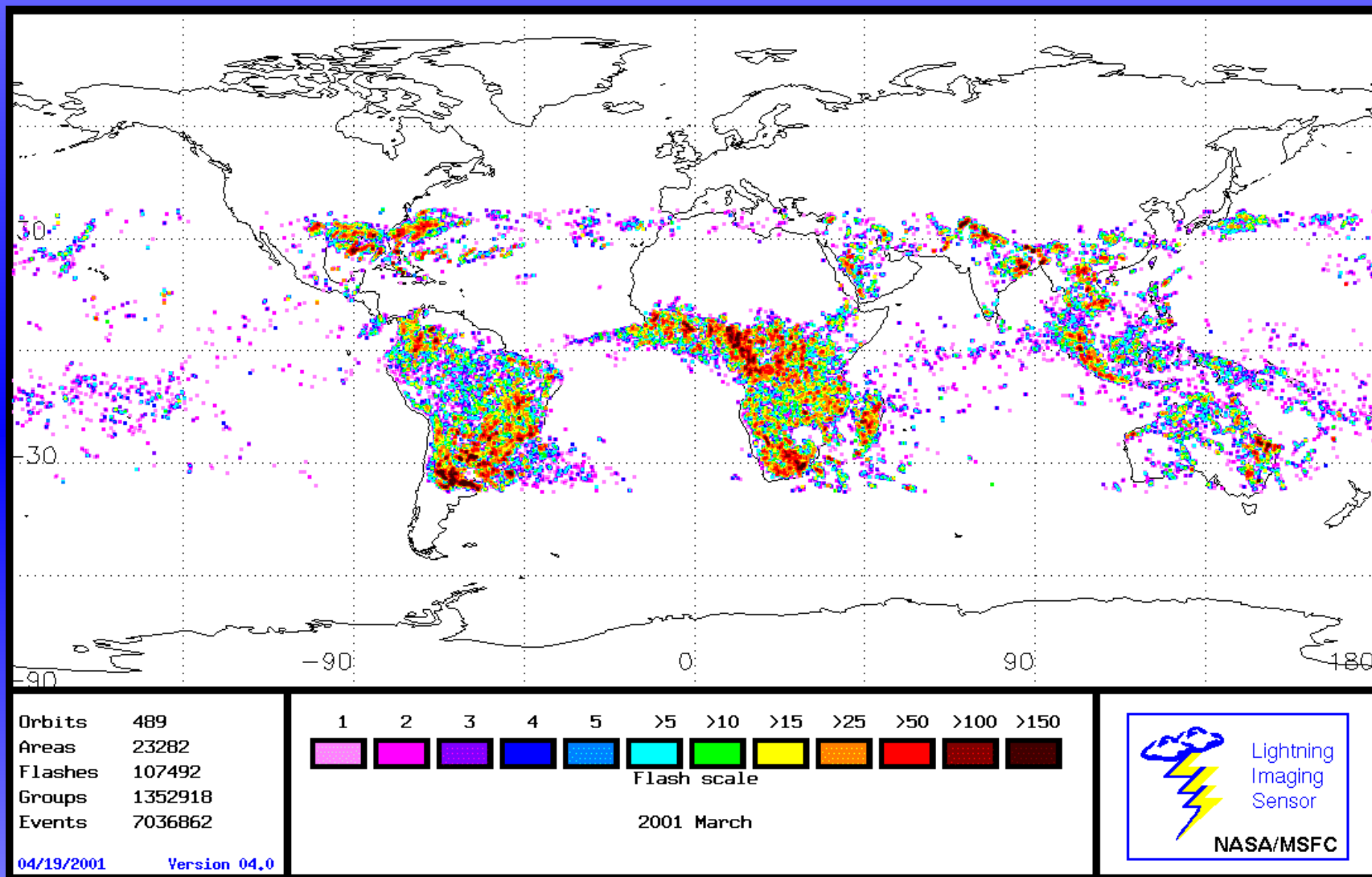
OLR ( $\text{W/m}^2$ ) Mean 2/23/01 to 3/17/01



OLR ( $\text{W/m}^2$ ) Mean 3/18/01 to 4/9/01



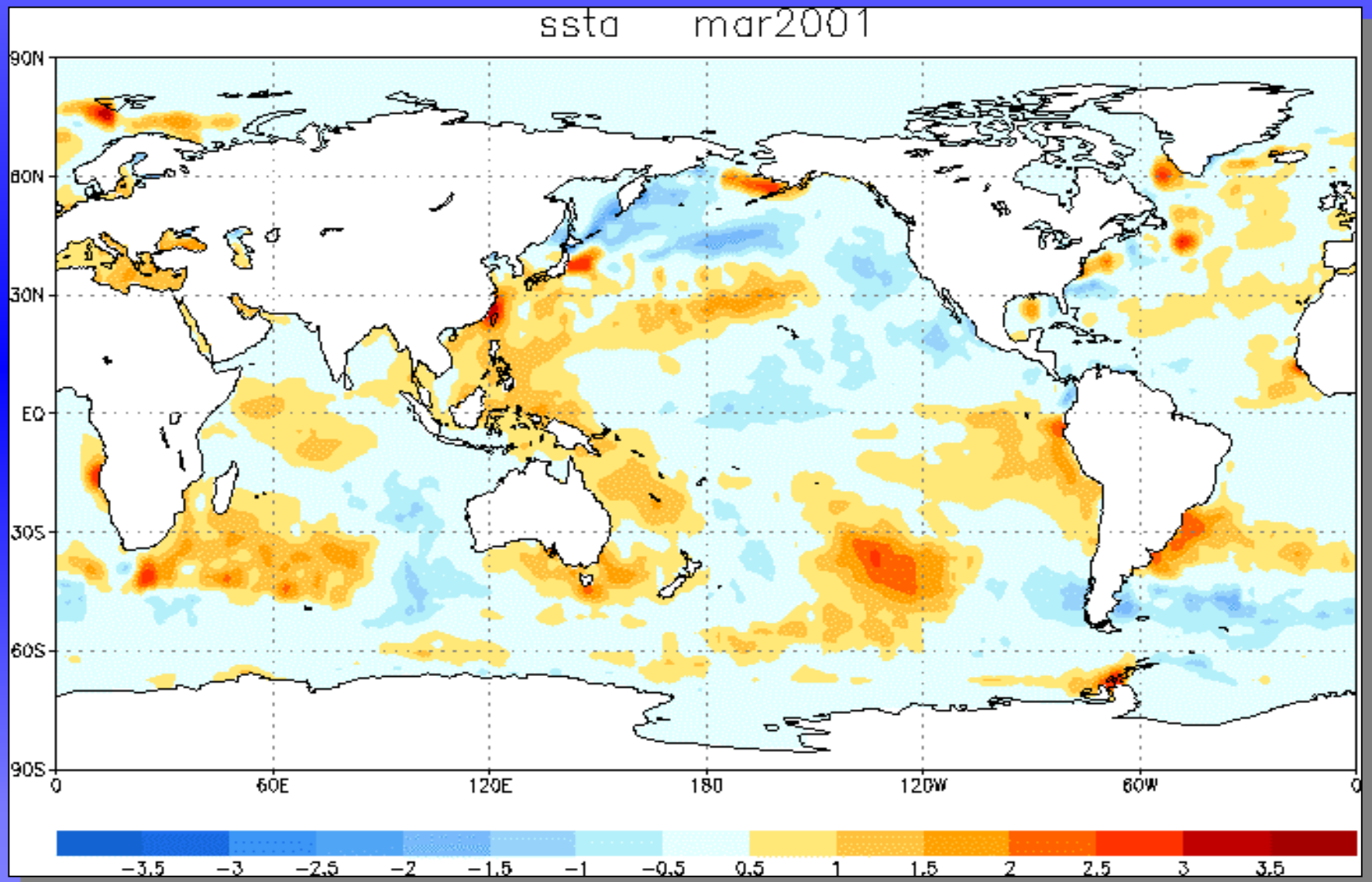
# Lightning for March 2001 ( $\pm 35^\circ$ lat.)



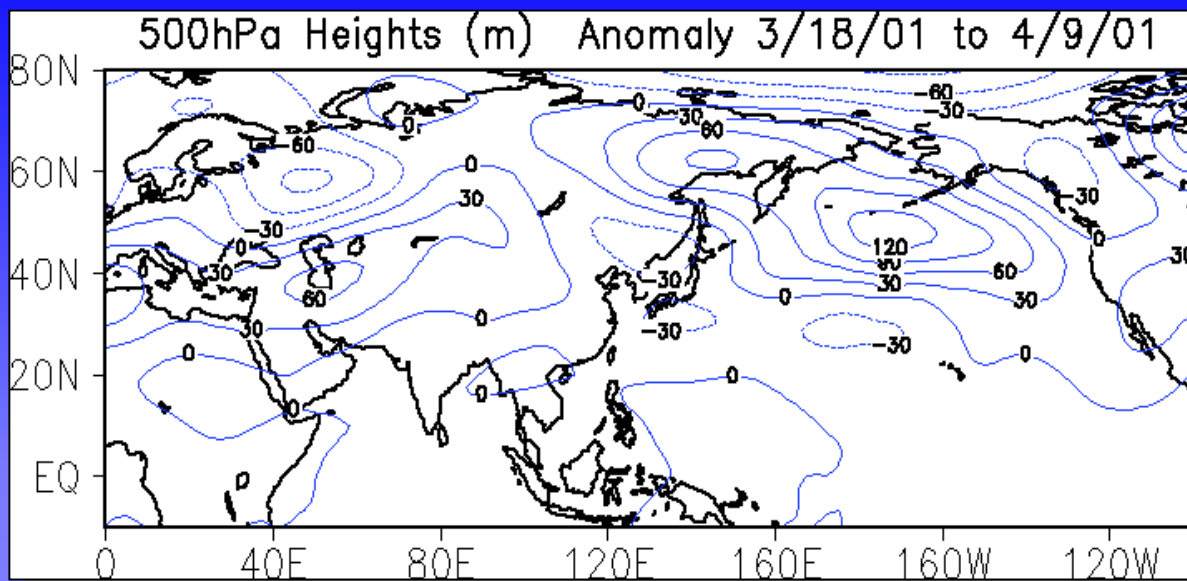
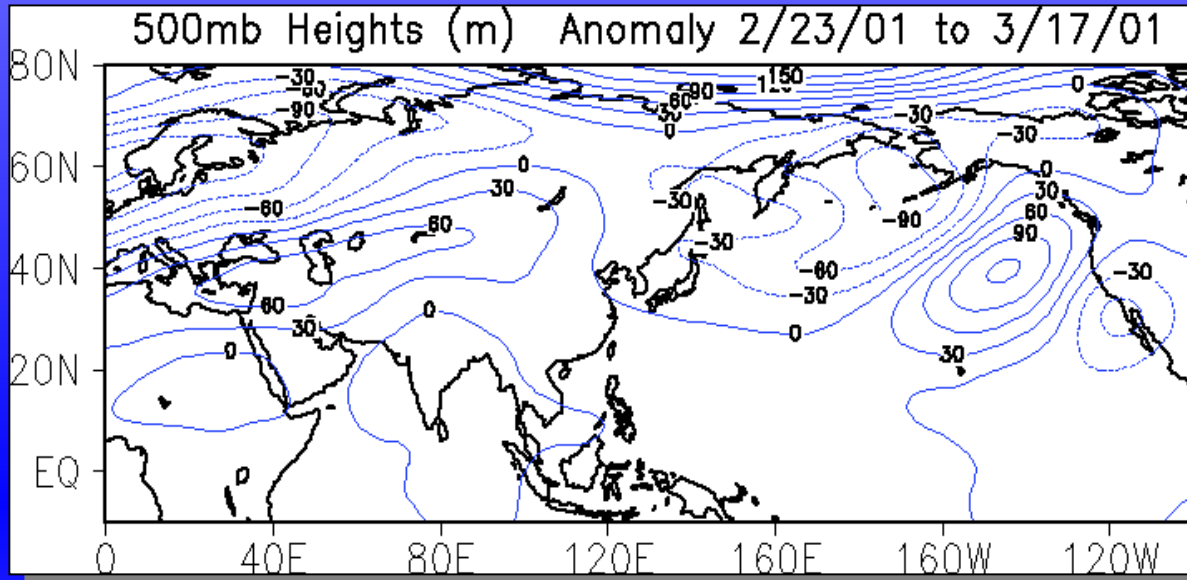
Polar orbit, 90% detection of **all** lightning within scan



# Sea Surface Temp Anomaly for March 2001

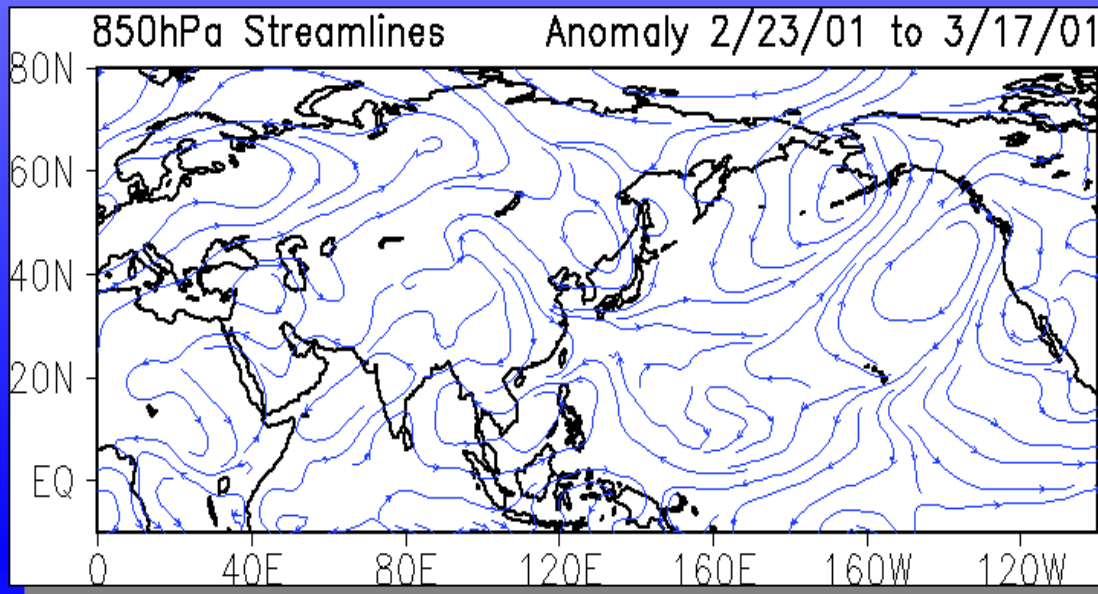


# 500 mb Height Anomaly

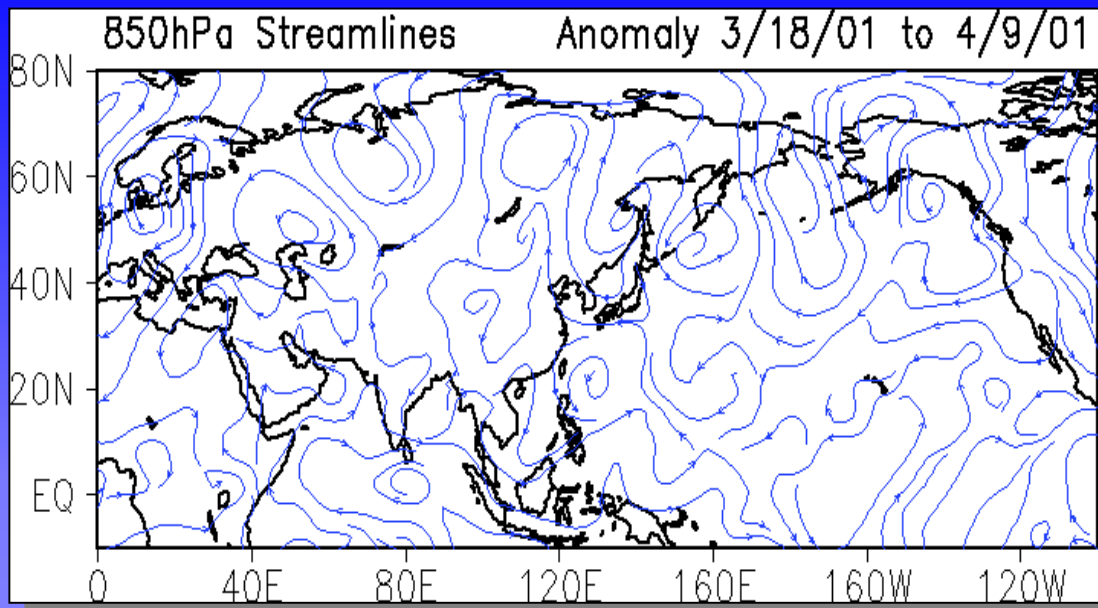


- Departures from long term mean
- Natural variability among neutral years
- 1st Half:
  - Aleutian Low
  - Subtropical High
- 2nd Half:
  - Aleutian Low weaker than normal

# Low Level Flow Anomaly



- TRACE - Climatology
- 1st Half:
  - Asian outflow stronger than normal
- 2nd Half:
  - More onshore flow than normal



## Upcoming Plans

- Place this presentation on our web site
- Prepare TRACE-P meteorological manuscript
  - Patterned after this presentation
  - If you have other topics for us to cover--Tell us
  - Hope to complete soon and place on the web
- Chris Kiley now describes our new web site

<http://bertha.met.fsu.edu/TRACEP>



**User Name: tracep**

**Password: fsumet01**



- ECMWF Data
  - 1.0 degree by 1.0 degree horizontal resolution
  - 61 sigma levels in vertical
  - 6 hourly data
- 5 Day Backward Trajectories
  - Calculated from exact flight positions and arriving at constant pressure levels 300, 500 700, 850 hPa along the flight path
  - Calculated at 5 min intervals
  - Additional trajectories were added at 25 hPa intervals during ascent and descent
- Flight Segments on Web
  - Flights divided into 4 vertical layers
  - A new flight segment was defined each time the aircraft passed into a different layer

# FSU TRACE-P Meteorological and Trajectory Products

The materials below constitute Florida State University's data product. Therefore, if you use the materials in your publications, we hope that you will follow the GTE data protocol.

## Choose Desired Flight: DC-8 Flights

Feb 26, 2001	DC-8 Flight 4	Transit: Dryden to Kona	▼	Go
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## P3-B Flights

Feb 26, 2001	P3-B Flight 5	Transit: Palmdale to Kona	▼	Go
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## DC-8 Summary Plots

DC-8 Transit Flights 850hPa and Below	▼	Go
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For quicker downloading, all plots may be accessed through FSU's anonymous FTP site at [bertha.met.fsu.edu](http://bertha.met.fsu.edu) . All files are contained in `/pub/outgoing/tracep/`.

To view trajectories, choose a [flight leg](#)

from the menu below.

## TRAJECTORIES

FLIGHT LEVEL ARRIVAL

Menu ▾

300 hPa ARRIVAL

Menu ▾

500 hPa ARRIVAL

Menu ▾

700 hPa ARRIVAL

Menu ▾

850 hPa ARRIVAL

Menu ▾

## STREAMLINES

HEMISPHERIC REGION

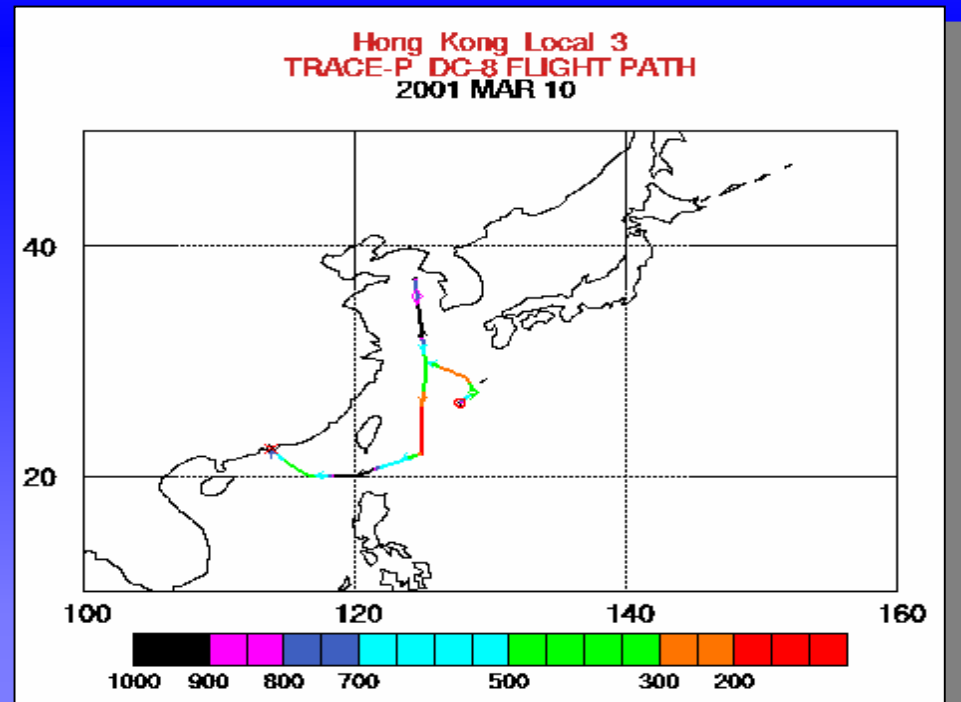
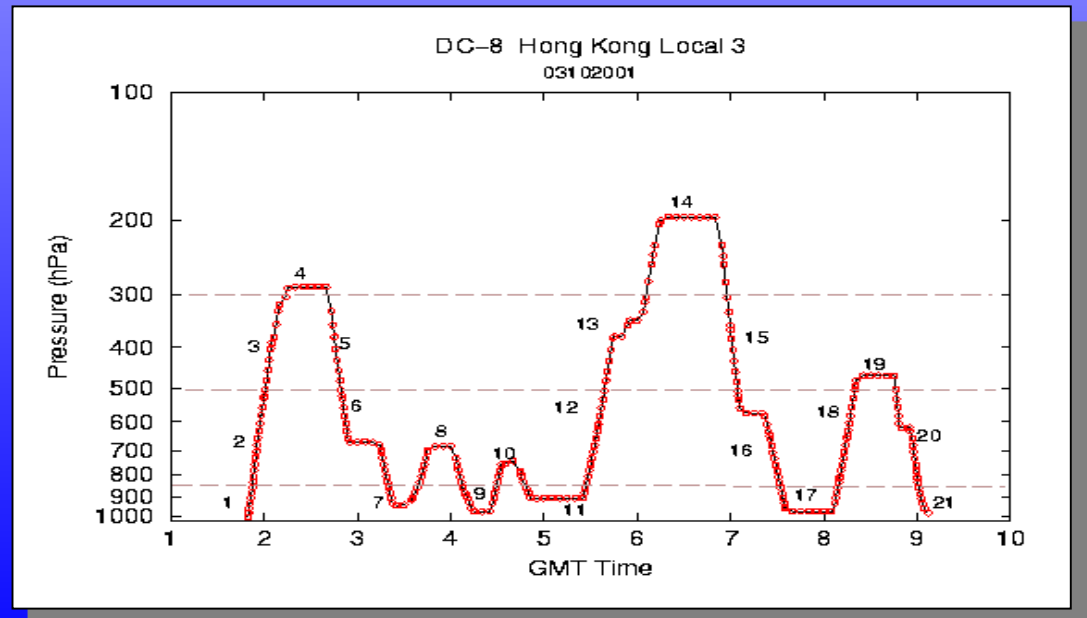
Menu ▾

FLIGHT REGION

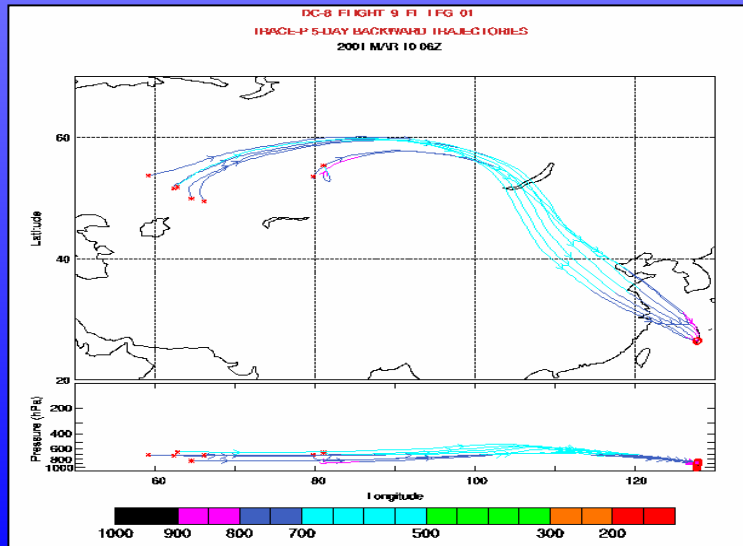
Menu ▾

[MAINPAGE](#)

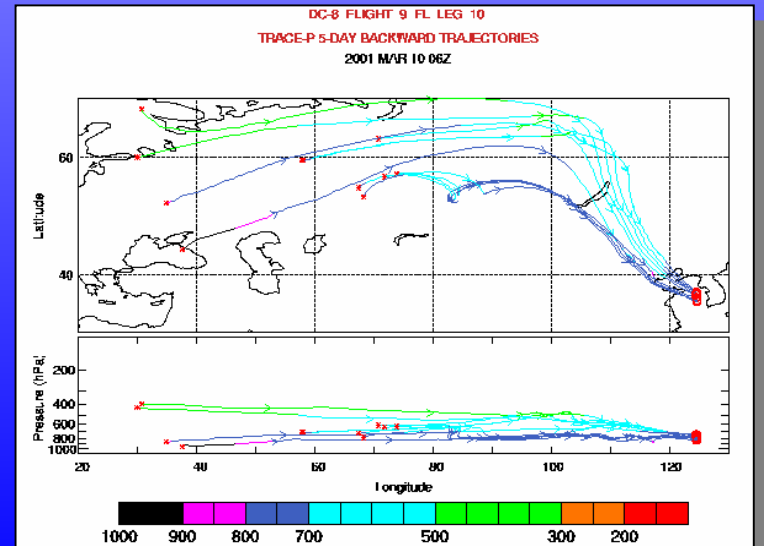
[DAVID WESTBERG'S SATELLITE IMAGERY](#)



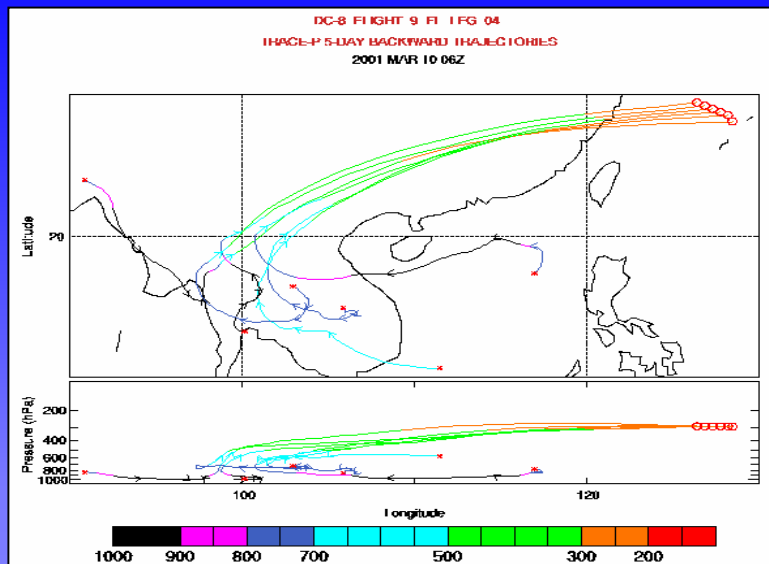
# LEG 1



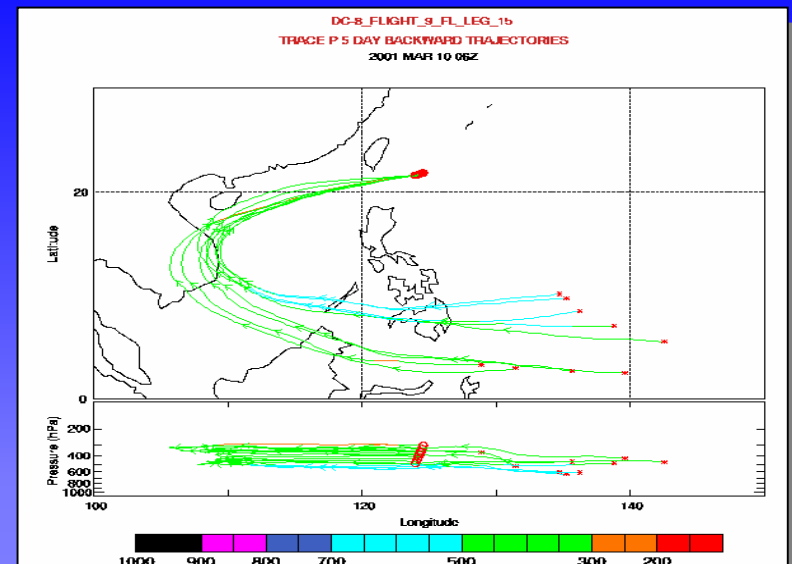
# LEG 9

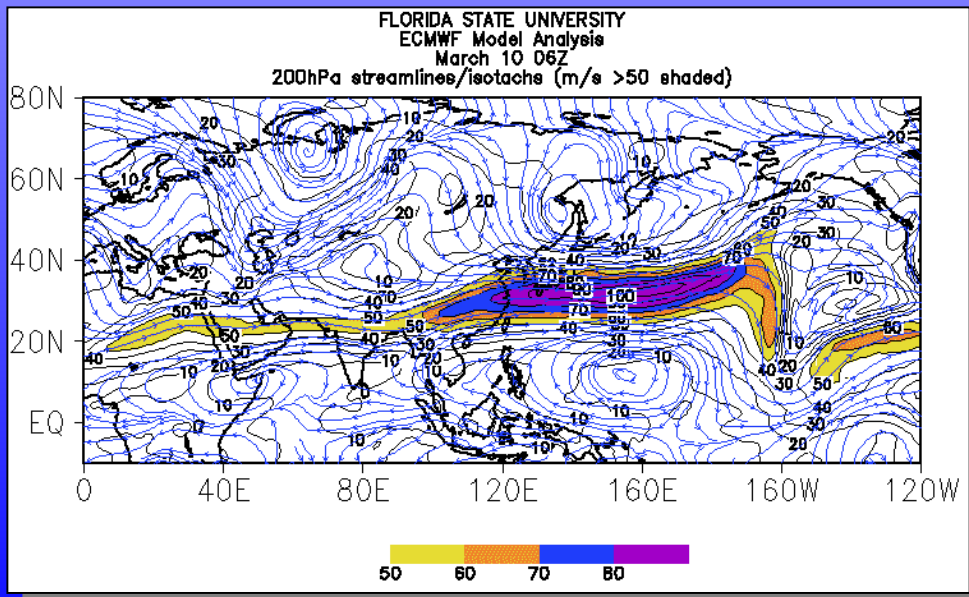


# LEG 4



# LEG 13





## Streamlines

Hemispheric Region

Flight Region

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200 hPa

300 hPa

500 hPa

700 hPa

850 hPa

MSLP hPa

